

REMARKS

At the time of the Office Action dated August 8, 2003, claims 1 and 3-20 were pending in this application. Of those claims, claims 1 and 3-11 have been rejected and claims 12-20 have been withdrawn from consideration pursuant to the provisions of 37 C.F.R. § 1.142(b). Claim 7 has been amended to address an informality generating an antecedent basis issue. Claims 1 and 3 have been cancelled, and claims 4 and 8-11 have been amended to address dependency issues arising from the cancellation of claim 1. Claim 17 has been amended to correct a typographical error. Applicants submit that the present Amendment does not generate any new matter issue.

Claims 1 and 3-11 are rejected under the second paragraph of 35 U.S.C. § 112

On the second and third pages of the statement of the rejection, the Examiner asserted that the use of the term "substantially" in claims 1 and 5-7 renders the claimed invention indefinite. This basis for the rejection is respectfully but vigorously traversed.

In the Amendment filed April 15, 2003, Applicants submitted a very detailed argument as to why the use of the term substantially in the phrase "substantially uniform thickness" is not indefinite. In particular, the Applicants cited the case of Verve, LLC v. Crane Cams, Inc.¹, which was decided less than one year ago. In this case, the Federal Circuit disapproved of a rejection, very similar to that put forth by the present Examiner, by the district court that determined that the expression "substantially constant wall thickness" was indefinite for lack in

¹ Case No. 01-1417 (Fed. Cir. November 14, 2002).

the specification or prosecution history of "a sufficiently clear definition of 'substantially'." The Federal Circuit relied upon previous case law, which described "substantially" as "a descriptive term commonly used in patent claims 'to avoid a strict numerical boundary to the specified parameter.'" The Federal Circuit concluded with regard to the indefiniteness issue by holding:

It is well establish that when the term "substantially" serves reasonably to describe the subject matter so that its scope would be understood by persons in the field of the invention, and to distinguish the claimed subject matter from the prior art, it is not indefinite. (emphasis added)

In the present Office Action, the Examiner stated the following:

"a substantially uniform thickness" in claim 1 last line, claims 5-7 penultimate paragraph, is indefinite; what constitutes "substantially uniform thickness" is vague and not defined or characterized in the specification to permit one skilled in the art to determine the metes and bounds of the claimed invention and its patentability with regard to the prior art, particularly in view of the fact that applicant is relying at least in part upon such "substantially uniform thickness" to overcome the applied prior art.

This is the only statement by the Examiner in the Office Action regarding this issue. This statement, however, fails to address why the Examiner believes the imposed rejection under the second paragraph of 35 U.S.C. § 112 is immune to case law from the Federal Circuit. In this regard, the Examiner is referred to M.P.E.P. § 707.07(f), which states that "the Examiner, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it." Applicants incorporate herein the arguments previously presented in the Amendments filed October 22, 2002, and May 15, 2003, regarding this issue. Should the Examiner be again inclined to reject claims 4-7 based on this issue, Applicants respectfully request that the Examiner address the substance of Applicants' arguments by putting forth an explanation as to why the Applicants' citation to the Federal Circuit case of Verve, LLC v. Crane Cams, Inc. is without basis.

The Examiner also rejected the term "said second insulating film" in claim 7 for lacking antecedent basis. By this amendment, Applicants have amended claim 7 to provide antecedent.

Also with regard to claim 7, the Examiner stated:

... In claim 7 penultimate line, "substantially equal" is vague as to what would be substantially equal. The specification does not define how difference the sum of thickness versus the lateral length would be to constitute substantially equal.

The last line of the above-reproduced citation is unclear, and Applicants are responding under the assumption the Examiner intended to state "[t]he specification does not define how [] the sum of [the] thickness[es of the first insulating film and the second insulating film would be substantially equal to] the lateral length []." The Examiner is referred to page 10 of the Amendment filed May 15, 2003, in which Applicants clearly stated that:

Tb = the thickness of the second insulating film on the sidewall of the gate electrode;

Td = the thickness of the first insulating film at the side of the gate electrode; and

Tsw = the lateral length of the first insulating film, such that

claim 7 recites that $T_{sw} = T_b + T_d$.

This limitation finds support throughout the originally-filed disclosure, for example, on page 16 and in Fig. 2. Applicants' position is that one having ordinary skill in the art would have no difficulty understanding the scope of claim 7, particularly when reasonably interpreted in light of the written description of the specification. Thus, the imposed rejection of claims 4-11 under the second paragraph of 35 U.S.C. § 112 have been overcome and, hence, Applicants respectfully solicits withdrawal thereof.

Claims 1 and 3 are separately rejected under 35 U.S.C. § 103 for obviousness based upon Akamatsu et al., U.S. Patent No. 6,180,472 (hereinafter Akamatsu) in view of Yu, U.S. Patent No. 6,380,038 or Mori et al., U.S. Publication No. US 2002/0000617 (hereinafter Mori)

On pages three through five of the statement of the rejection, the Examiner asserted that one having ordinary skill in the art would have been motivated to modify Akamatsu in view of Yu or Mori to arrive at the claimed invention. As claims 1 and 3 have been cancelled, the Examiner's rejection is moot.

Claim 4 is separately rejected under 35 U.S.C. § 103 for obviousness based upon Akamatsu in view of Yu or Mori

On page five of the statement of the rejection, the Examiner asserted that one having ordinary skill in the art would have been motivated to modify Akamatsu in view of Yu or Mori to arrive at the claimed invention. Claim 4 has been amended to depend from claim 5, which the Examiner admits is not disclosed by the combination of Akamatsu in view of Yu or Mori. Thus, the Examiner's rejection of claim 4 based on Akamatsu in view of Yu or Mori is moot.

Claim 7 is separately rejected under 35 U.S.C. § 103 for obviousness based upon Akamatsu in view of Yu or Mori

On pages six and seven of the statement of the rejection, the Examiner asserted that one having ordinary skill in the art would have been motivated to modify Akamatsu in view of Yu or Mori to arrive at the claimed invention. This rejection is respectfully traversed.

Claim 7 recites that the sum of the thickness of a first insulating film and a thickness of a second insulating film on the sidewall of a gate electrode is substantially equal to the lateral length of a first insulating film at the side of the gate electrode. Referring to Fig. 2 of Applicants' disclosure, T_b = the thickness of the second insulating film on the sidewall of the gate electrode; T_d = the thickness of the first insulating film at the side of the gate electrode; and T_{sw} = the lateral length of the first insulating film. Claim 7 recites that $T_{sw} = T_b + T_d$.

Regarding this particular limitation, the Examiner stated:

Regarding the limitation in claim 7 last three lines reciting the sum of the thickness of the first insulating film and the thickness of the insulating film on the sidewall of the gate electrode is substantially equal to the lateral length of the first insulating film at the side of the gate electrode, the selection and optimization of such layer thicknesses and desired lateral length would have been encompassed in the magnitude of the respective layer thicknesses in Akamatsu and further would have been obvious as substantially shown in Akamatsu Fig. 2(c) and as delineated in Akamatsu wherein the thickness of layer 15 being 10 to 20 nm; the thickness of layer 16 being 40 to 60 nm; and the thickness of layer 12 being 30 to 50nm. Such would have been further obvious as evidenced by Yu column 4 lines 20-31 and by Mori [0077] to obtain the desired LDD length.

Applicants have previously argued that the Federal Circuit has held that in order to establish the requisite motivation to modify a particular reference, the Examiner must make "clear and particular" factual findings, not generalizations, as to a specific understanding or specific technological principle which would have realistically impelled one having ordinary skill in the art to modify a particular prior art reference to arrive at the claimed invention. In so doing, the Examiner must provide facts and explain why one having ordinary skill in the art would have been realistically motivated to modify the thicknesses of the oxide films 15, 16 of Akamatsu to arrive at the claimed invention.

Claim 7 recites a limitation involving the lateral length (T_{sw}) of the first insulating film as it relates to the combined thicknesses of the first insulating film and the second insulating film on

the sidewall of a gate electrode. Although Akamatsu teaches that the non-doped oxide film 15 has a thickness of 10 to 20 nm and the doped oxide film 16 has a thickness of 40 to 60 nm, Akamatsu is completely silent as to the lateral length of the non-doped oxide film. Thus, one having ordinary skill in the art cannot ascertain what lateral length, if any, Akamatsu is advocating, and what relationship that lateral length has with the combined thicknesses of the non-doped oxide film 15 and the doped oxide film 16. Notwithstanding Akamatsu's silence as to lateral length of the first insulating film, the Examiner did cite Yu and Mori for the stated purpose "to obtain the desired LDD length."

Although the lateral length of the first insulating film can have a bearing on the positioning of the LDD, the Examiner has failed to provide any reasonable connection between making the lateral length of the first insulating film equal to the combined thicknesses of the second insulating film and the first insulating film provides and obtaining a desired LDD length. The limitation is not necessary to obtain a desired LDD length, and as such, Applicants are unclear as to what in the applied prior art leads the Examiner to believe that following the limitation recited in claim 7 would result in a desired LDD length. Therefore, since the Examiner has failed to establish a reasonable motivation to combine the applied prior art, one having ordinary skill in the art would not have considered that the claimed invention, as recited in claim 7, obvious under 35 U.S.C. § 103 based upon Akamatsu in view of Yu or Mori.

Claims 5 and 6 are rejected under 35 U.S.C. § 103 for obviousness based upon Akamatsu in view of Yu or Mori and further in view of Wolf

On pages seven and eight of the statement of the rejection, the Examiner asserted that one having ordinary skill in the art would have been motivated to modify Akamatsu in view of Yu or Mori and further in view of Wolf to arrive at the claimed invention. This rejection is respectfully traversed.

Referring to Fig. 2 of Applicants' disclosure:

Ta = the thickness of the second insulating film on the top surface of the gate electrode;

Tb = the thickness of the second insulating film on the sidewall of the gate electrode; and

Tc = the thickness of the second insulating film on the surface of the semiconductor substrate.

Thus, claim 5 recites that $(Tb < Ta)$ and $(Tb < Tc)$; and

claim 6 recites that $(Tc < Ta)$.

With regard to claims 5 and 6, the Examiner stated:

The references are applied as above. Regarding the thickness on the sidewall being less than the thickness on the top surface or surface of the substrate, would have been further obvious as evidenced by Wolf, page 368 and Fig. 32 evidencing the step coverage would depend upon the surface of the underlying structure, including the shape and the slope thereof, and as shown in Fig. 32(b) wherein the thickness on top of the structure is greater than that at the sidewall or at the bottom surface.

The Examiner's citation to Wolf is misplaced. Page 368 and Fig. 32 of Wolf merely describe that a measure of how well a film maintains its nominal thickness is expressed by the ratio (i.e., step coverage ratio) of the minimum thickness of a film as it crosses a step to the nominal thickness of the film on flat regions. Wolf also discusses that the height of the step and the aspect ratio of the feature being covered affects step coverage. Wolf, however, does not teach or

suggest the limitations recited above. Furthermore, Wolf does not suggest that these limitations are desirable or inherently present. Instead, Wolf merely describes a measure used to describe step coverage. A prima facie case of obviousness requires a motivation to combine that results in some expected result. Absent such a motivation, why would one having ordinary skill in the art combine the applied prior art in the manner suggested by the Examiner? This required motivation to combine, however, has not been provided by the Examiner.

The Examiner also stated:

Additionally, the "greater" and "smaller" claimed in these claims do not provide any sufficient demarcation from the prior art and such would have been within the purview of one skilled in the art and would have been expected or otherwise met from the prior art given the slight variance due the vertical sidewalls and the horizontal flat surface of the gate and source/drain regions.

A prima facie basis of obviousness must be established by facts, not the Examiner's theories as to particular characteristics of a claimed feature. As the Examiner has not cited to any references for support, Applicants respectfully submit that the Examiner has failed to establish any factual basis for these assertions. For this reason, the Examiner's arguments are immaterial as to whether the claimed invention is obvious in view of the applied prior art.

Applicants further note that the Examiner's arguments all appear to be based on the variance of thicknesses on vertical sidewalls. However, claim 6 is not directed to vertical sidewalls at all. Instead, claim 6 compares the thickness of the second insulating film on top of the gate electrode versus the thickness of the second insulating film on the surface of the semiconductor substrate. Applicants, therefore, respectfully submit that one having ordinary skill in the art would not have considered that the claimed invention, as recited in claims 5 and 6, is

obvious under 35 U.S.C. § 103 based upon Akamatsu in view of Yu or Mori and further in view of Wolf.

Claim 8 is rejected under 35 U.S.C. § 103 for obviousness based upon Akamatsu in view of Yu or Mori and further in view of JP 11-274300 (hereinafter Otani)

On page five of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Akamatsu in view of Yu or Mori and further in view of Otani to arrive at the claimed invention. This rejection is respectfully traversed.

Claim 8 depends ultimately from independent claim 5, and Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 5 under 35 U.S.C. § 103 for obviousness based upon Akamatsu. The secondary reference to Otani does not cure the argued deficiencies of Akamatsu in view of Yu or Mori. Accordingly, the proposed combination of references would not yield the claimed invention. Applicants, therefore, respectfully submit that the imposed rejection of claim 8 under 35 U.S.C. § 103 for obviousness based upon Akamatsu in view of Yu or Mori and further in view of Otani is not viable and, hence, solicit withdrawal thereof.

Claims 9 and 11 are rejected under 35 U.S.C. § 103 for obviousness based upon Akamatsu in view of Yu or Mori and further in view of Ohno, U.S. Patent No. 5,621,232

On page five of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Akamatsu in view of Yu

or Mori and further in view of Ohno to arrive at the claimed invention. This rejection is respectfully traversed.

Claims 9 and 11 depend ultimately from independent claim 5, and Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 1 under 35 U.S.C. § 103 for obviousness based upon Akamatsu in view of Yu or Mori. The reference to Ohno does not cure the argued deficiencies of Akamatsu in view of Yu or Mori. Accordingly, the proposed combination of references would not yield the claimed invention. Applicants, therefore, respectfully submit that the imposed rejections of claims 9 and 11 under 35 U.S.C. § 103 for obviousness based upon Akamatsu in view of Yu or Mori and further in view of Ohno is not viable and, hence, solicit withdrawal thereof.

Claim 10 is rejected under 35 U.S.C. § 103 for obviousness based upon Akamatsu in view of Yu or Mori and further in view of Braeckelmann, et al., U.S. Patent No. 5,621,232 (hereinafter Braeckelmann)

On page six of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Akamatsu in view of Yu or Mori and further in view of Braeckelmann to arrive at the claimed. This rejection is respectfully traversed.

Claim 10 depends ultimately from independent claim 5, and Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 5 under 35 U.S.C. § 103 for obviousness based upon Akamatsu. The reference to Braeckelmann does not cure the